

**Site:** Central Oregon Gunnery Range

**Location:** Lakeview, Oregon

**USACE District:** Seattle

**TPP #1 Meeting Location:** Bureau of Land Management, Lakeview, Oregon

**TPP #1 Meeting Date:** 7/17/06

## **Agenda (tentative)**

Monday, July 17, 2006 (all times are Pacific Standard Time)

- **2:00 AM      Convene at BLM Office**
  - Introductions
  - Review Site Inspection Objectives
    - Goals, Objectives, Roles & Responsibilities
    - Site Inspection Process
    - Technical Project Planning (TPP) Process
    - Review of Background Information
- **3:30 PM      Technical Project Planning Discussion**
- **5:00 PM      Conclude Meeting**
- **7:00 PM      Public Meeting**

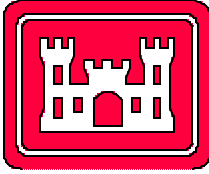
This Technical Project Planning (TPP) Meeting Package contains information for discussion and evaluation of Formerly Used Defense Sites (FUDS) at the TPP Meeting. It is provided to participants of the TPP Meeting and will be updated and redistributed as the Draft TPP Memorandum.

Sign-in Sheet  
 Technical Project Planning Meeting  
 Central Oregon Gunnery Range  
 July 17, 2006

Name	Affiliation	Address	Phone Number	E-mail
Michael Watson	USACE	106 South 15th Street Omaha, NE 68102-1618	402-221-7703	<a href="mailto:Michael.S.Watson@nwo02.usace.army.mil">Michael.S.Watson@nwo02.usace.army.mil</a>
Mike Nelson	USACE	4735 E Marginal Way S. Seattle, WA 98124-3755	206-764-3458	<a href="mailto:Michael.d.nelson@usace.army.mil">Michael.d.nelson@usace.army.mil</a>
David Anderson	ODEQ	2146 NW 4 <sup>th</sup> Bend, OR	541-388-6146 Ext, 258	<a href="mailto:Anderson.Davis@deq.state.or.us">Anderson.Davis@deq.state.or.us</a>
Dale Landon	Shaw	1045 Jadwin Ave, Suite C Richland, WA 99352	509-946-2069	<a href="mailto:Dale.Landon@shawgrp.com">Dale.Landon@shawgrp.com</a>

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Michael Watson	USACE	106 South 15th Street Omaha, NE 68102-1618	402-221-7703	<a href="mailto:Michael.S.Watson@nwo02.usace.army.mil">Michael.S.Watson@nwo02.usace.army.mil</a>
Mike Nelson	USACE	4735 E Marginal Way S. Seattle, WA 98124-3755	206-764-3458	<a href="mailto:Michael.d.nelson@usace.army.mil">Michael.d.nelson@usace.army.mil</a>
David Anderson	ODEQ	2146 NW 4 <sup>th</sup> Bend, OR	541-388-6146 Ext, 258	<a href="mailto:Anderson.Davis@deq.state.or.us">Anderson.Davis@deq.state.or.us</a>
Dale Landon	Shaw	1045 Jadwin Ave, Suite C Richland, WA 99352	509-946-2069	<a href="mailto:Dale.Landon@shawgrp.com">Dale.Landon@shawgrp.com</a>



**U.S. Army Corps of Engineers  
Omaha District**

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**Technical Project Planning  
Meeting Package  
Central Oregon Gunnery Range  
FUDS ID F10OR0170**

**Site Inspections at Multiple Sites, NWO Region  
Formerly Used Defense Sites, Military Munitions  
Response Program**

**Contract No. W912DY-04-D-0010  
Delivery Order No. 003**

**July 11, 2006**



9201 East Dry Creek Road  
Centennial, CO 80112

# **Technical Project Planning Memorandum**

## **Site Inspection Central Oregon Gunnery Range Formerly Used Defense Site FUDS ID F10OR0170**

### **Military Munitions Response Program**

Documentation for Technical Project Planning Meeting  
Bureau of Land Management  
Lakeview, Oregon  
July 17, 2006

Hosted by U.S. Army Corps of Engineers

Prepared by Shaw Environmental, Inc.

July 11, 2006

#### Concurrences

USACE Omaha Design Center

\_\_\_\_\_  
Michael Watson

USACE Seattle District

\_\_\_\_\_  
Mike Nelson

Oregon Department of Environmental Quality

\_\_\_\_\_  
David Anderson

Shaw Environmental, Inc.

\_\_\_\_\_  
Peter Kelsall

## TABLE OF CONTENTS

<b>ABBREVIATIONS AND ACRONYMS.....</b>	<b>ii</b>
<b>ADMINISTRATIVE INFORMATION .....</b>	<b>1</b>
<b>SITE INSPECTION OBJECTIVES .....</b>	<b>3</b>
Goal.....	4
Objectives.....	4
Roles & Responsibilities .....	4
Site Inspection Process.....	5
Technical Project Planning Process .....	5
<b>BACKGROUND INFORMATION .....</b>	<b>6</b>
Site Description and Regulatory History.....	7
Operational History and MEC/MC Characteristics .....	8
Groundwater.....	9
Surface Water.....	9
Terrestrial Exposure .....	9
Air .....	10
<b>CONCEPTUAL SITE MODEL .....</b>	<b>11</b>
Overview .....	12
Conceptual Site Model – Air-to-Air Gunnery Range MRS .....	13
Data Gaps .....	16
<b>PROPOSED SAMPLING SCHEME.....</b>	<b>17</b>
Proposed Field Investigation.....	18
<b>TPP NOTES AND DATA QUALITY OBJECTIVES .....</b>	<b>20</b>
Technical Project Planning and Development of Data Quality Objectives .....	21
TPP Phases .....	21
Data Quality Objectives.....	24
Next Steps .....	26
<b>FIGURES .....</b>	<b>27</b>
<b>TABLES .....</b>	<b>28</b>
<b>DRAFT WORKSHEETS .....</b>	<b>32</b>

## ABBREVIATIONS AND ACRONYMS

AOC	area of concern
ASR	Archives Search Report
BLM	Bureau of Land Management
COGR	Central Oregon Gunnery Range
CSM	Conceptual Site Model
DoD	Department of Defense
DOI	Department of the Interior
DQO	Data Quality Objective
°F	degrees Fahrenheit
ft	foot or feet
FUDS	Formerly Used Defense Site
GPS	global positioning system
HRS	Hazard Ranking System
MC	munitions constituents
MEC	munitions and explosives of concern
mm	millimeter
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
MRSP	Munitions Response Site Prioritization Protocol
NDAI	No Department of Defense Action Indicated
ODEQ	Oregon Department of Environmental Quality
PCOC	potential contaminant of concern
RAC	Risk Assessment Code
RI/FS	Remedial Investigation/Feasibility Study
Shaw	Shaw Environmental, Inc.
SHPO	State Historic Preservation Office
SI	Site Inspection
SSWP	Site-Specific Work Plan
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance

# ***Administrative Information***

***Site Inspection  
Central Oregon Gunnery Range***

***Technical Project Planning Meeting  
July 17, 2006***



The Technical Project Planning (TPP) Memorandum is one in a series of documents used during the Site Inspection (SI) process to document the information collected and processes used to evaluate Formerly Used Defense Sites (FUDS) for the possible presence of munitions and explosives of concern (MEC) and/or munitions constituents (MC). TPP meeting information provided in the Memorandum reflects both the original version of information shared with meeting participants, as well as changes/updates to site-specific information obtained during the TPP meeting.

The TPP meeting for the former Central Oregon Gunnery Range (COGR) will be conducted on July 17, 2006 at the Bureau of Land Management (BLM) offices located in Lakeview, Oregon. Representatives from the U.S. Army Corps of Engineers (USACE) – Omaha Design Center and Seattle District, the Oregon Department of Environmental Quality (ODEQ), BLM, and Shaw Environmental, Inc. (Shaw) will be in attendance. By agreement with the USACE, landowners (other than BLM) will not be present at this meeting. A separate meeting with landowners will be held in the evening on the same day. A site tour will not be conducted as part of this meeting.

The TPP Memorandum documents discussions for the TPP meeting and includes the sections described below:

- **Administrative Information:** includes meeting logistics and the list of attendees;
- **Site Inspection Objectives:** provides the goal and objectives of the SI, roles and responsibilities, the SI process, and the TPP process;
- **Background Information:** includes site and project history, area physical setting, a summary of previous environmental work, and an introduction to the areas of concern (AOCs) addressed by the SI;
- **Conceptual Site Model (CSM):** identifies environmental attributes, potential human and ecological receptors in the area's environment, and the relationships between these factors;
- **Proposed Sampling Scheme:** describes the type and quantity of samples to be taken, and the analytical methods to be used for characterizing the AOC;
- **TPP Notes and Data Quality Objectives (DQOs):** captures project and site-specific information as discussed during the TPP meeting to ensure the necessary and appropriate information is shared among meeting participants, and that meeting participants concur with the identified goal, objectives, and approach used to complete the SI process; and
- **Worksheets:** includes the **Site Information Worksheet**, **Draft Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps**, and **Hazard Ranking System (HRS) Data Gaps**.

# ***Site Inspection Objectives***

***Site Inspection  
Central Oregon Gunnery Range***

***Technical Project Planning Meeting  
July 17, 2006***

## Goal

- The USACE is conducting SIs of FUDS properties to determine if any MEC or related MC are present on property formerly owned or leased by the U.S. Department of Defense (DoD).

## Objectives

- Determine if the site requires further response action due to the presence of MEC/MC.
- Collect minimum information needed to:
  - Eliminate a site from further consideration if:
    - No evidence of MEC and/or
    - Concentrations of MC in samples are below risk-based action levels, or below background concentrations; or
  - Determine the potential need for removal action or initiation of the Remedial Investigation/Feasibility Study (RI/FS) if:
    - MEC identified and/or
    - Concentrations of MC in samples exceed risk-based action levels and background concentrations.
  - Provide sufficient data for the U.S. Environmental Protection Agency (USEPA) and the Army to prioritize future actions using the HRS and MRSPP.

## Roles & Responsibilities

- **USACE:** Acts as the executing agency for the DoD with regard to the FUDS program. In this role, the USACE has decision making authority and is responsible for ensuring work is conducted in accordance with applicable USACE and federal guidance. Additionally, USACE coordinates and works with project team members to meet needs expressed by regulatory agencies and stakeholders to the extent possible within programmatic guidelines.
- **Regulatory Agency:** Participates in planning of SI activities to ensure the project meets applicable state standards and requirements.
- **Property Owner(s):** Provides available and pertinent information about the area, provides in sight on current and anticipated future land uses for the property, and participates in project team discussions.
- **Shaw:** As a contractor to the USACE, conducts work on behalf of the USACE, provides TPP materials, makes site information available to the project team through a web-based information portal, and conducts and reports SI activities.

## **Site Inspection Process**

- Data review,
- TPP,
- Site-Specific Work Plan (SSWP),
- SI field activities – reconnaissance, sampling, and analysis, and
- SI Report.

## **Technical Project Planning Process**

- Conduct TPP meeting(s)<sup>\*</sup> with key organizations and stakeholders;
- Identify stakeholder(s) concerns;
- Identify all AOCs for this SI;
- Review site information;
- Verify current and anticipated future land use;
- Develop CSM;
- Identify data gaps;
- Plan how to address data gaps;
- Develop DQOs for meeting SI requirements; and
- Concur on SI field work approach.

<sup>\*</sup> Second TPP meeting to be determined by team members during the 1<sup>st</sup> TPP meeting.

# ***Background Information***

***Site Inspection  
Central Oregon Gunnery Range***

***Technical Project Planning Meeting  
July 17, 2006***

## Site Description and Regulatory History

Historical information (including references to interviews and historical documents) contained in this package was obtained from the *Archives Search Report* (ASR) (USACE, 1995) and *ASR Supplement* (USACE, 2004) for the COGR.

### Site Location

- The former COGR is located in Lake County, Oregon approximately 35 miles north of Lakeview, Oregon, and 48 miles southwest of Burns, Oregon. It is located in the south central portion of Oregon (Figure 1).
- The COGR occupied 795,056 acres that was acquired in 1942.
- The former COGR has one Munitions Response Site (MRS) that includes air-to-air, air-to-ground, and ground-to-air ranges.

### Physical Setting

- The COGR lies within the Walla Walla Plateaus section of the Columbia Intermontane Physiographic Province.
- The elevation of the area ranges from approximately 4,100 feet (ft) near Alkali Lake on the east boundary to nearly 6,000 ft at St. Patrick Mountain to the west.
- The COGR is a relatively flat region characterized by sand dunes and alkali lakes. Elevated features are predominantly volcanic in origin.
- The site is currently used for agricultural purposes and grazing on open range land.
- Lakeview, Oregon is the nearest incorporated community (approximately 35 miles south) with a population of 2,420 (2004 estimated census).
- The climate in the COGR area is semi-arid. It is warm and dry in the summer and cool and dry in the winter. The wettest months are generally January and December with the driest months being July and August. The highest monthly average temperature is 84.2 degrees Fahrenheit (°F) in July and the lowest monthly average temperature is 19.0 °F in January. Lakeview's average annual precipitation is 14.93 inches per year, with an average annual snowfall of 57 inches.
- Current landowners include private citizens, the BLM, and agricultural industry.
- The Alkali Lake Disposal Site is located adjacent to and south of the southern target site. The site is a hazardous waste disposal site consisting of a series of 12 shallow unlined disposal trenches approximately 400 ft long. Wastes disposed include herbicide residue, metallic chloride waste, paint and paint solvent, and dioxins/furans. There is an approximately 2,000-ft-long groundwater plume extending to the west-northwest. The site is currently monitored by the ODEQ.
- The FUDS access is uncontrolled.

## **Previous Investigations and Regulatory History**

- A letter from the USACE to the Department of the Interior (DOI) in 1947 informed that “The lands had been examined and have been cleared of all explosives or explosive objects reasonably possible to detect by visual inspection.”
- A .50-caliber ammunition belt was found in the northern portion of the MRS in 1990.
- The USACE prepared an Inventory Project Report and Findings and Determinations of Eligibility for the COGR in 1993. The report determined that the site was eligible for Defense Environmental Restoration Program for FUDS.
- The USACE issued an ASR in 1995, which compiled available information for COGR with emphasis on types and areas of ordnance use and disposal. The ASR included a visit to the site in August of 1995. The primary purpose of the site visit was to assess the presence of MEC through non-intrusive means. Interviews, historical research, and site reconnaissance confirmed that nothing other than small and medium arms (.50-caliber and 20 mm) were used at COGR.
- An ASR Supplement completed in 2004 identified the entire range as one AOC (now considered to be one MRS). A Risk Assessment Code (RAC) scoring was conducted by the USACE in 2004. Possible scores range from 5 (no risk) to 1 (high risk). The RAC score was 4.

## **Operational History and MEC/MC Characteristics**

### **Historic Military Operations**

- In 1942, the United States Government acquired 795,056 acres for the purpose of an aerial gunnery range.
- The COGR served as an aerial gunnery range and included air-to-air training and air-to-ground practice. It also was reported that the FUDS may have been used to some extent for air-to-ground bombing purposes, although no direct evidence has been found for this use.
- It was reported that a portion of the FUDS near Alkali Lake was used for machine gun training that used .50-caliber machine guns. In addition, it was reported that rockets were fired from the same location (Lake County Examiner, 1943). The COGR was also used during the Northwest Maneuvers of 1943.
- Two air-to-ground target areas are located near Alkali Lake (Figure 2), and .50-caliber and 20-mm rounds are found in the area. The southern target is a triangular mound, approximately 15 feet high, and covering an area of approximately 10 acres. The remnants of seven wood structures, presumably targets, are located on the mound, in an east-west line. The layout seems to represent a convoy. The northern target area is situated on a naturally occurring rise. Some wood, possibly used for a target, was found at this location.
- The COGR was declared excess in June 1947 and transferred to the DOI.

## **MEC/MC Characteristics**

- The MEC used at the COGR was limited to small arms ranging from .50-caliber to 20-mm ball. Table 1 lists the constituents of the munitions.
- No chemical warfare materiel has been used at the site.

## **Groundwater**

- Where present, the soils at COGR are thin. For the most part, the surface is composed of various rock outcroppings, mostly of basalt.
- The area is heavily faulted, with northwest trending faults that have been softened by erosion and are visible from the air. The faults are collectively named the Brothers fault. South of the fault line the lava plateau is broken into big fault block mountains and a valley, and to the north the lava plateau is mostly unbroken by faulting (Alt and Hyndman, 1990).
- Depth to shallow groundwater near the target areas is approximately 6 ft, based on groundwater monitoring studies at the Alkali Lake Disposal Site. However, depth to potable water is much deeper as this area is primarily overlain by basalt, and there is little communication between surface water and groundwater.
- There are numerous private groundwater wells within the 795,000-acre COGR. Most of the wells are used for irrigation purposes and are completed in deep aquifers. There are several wells located near the target areas at Alkali Lake.

## **Surface Water**

- The COGR is located within the Summer Lake and Lake Abert Watersheds.
- Because of the flat topography, there is little developed stream drainage and most precipitation collects in shallow ponds and lakes that evaporate in the summer.
- Much of the water in the area lakes is alkaline in chemistry, due to the high evaporative rates in the summer and low stream inflows/outflows.
- There is little surface water to groundwater communication because of the near surface basalt bedrock.

## **Terrestrial Exposure**

- Based on the size and population of Lake County Oregon, the population density is less than 1 person per square mile. There are no residences or schools/day care facilities within several miles of the two target areas at Alkali Lake.
- The ASR identified four species of endangered wildlife and one type of threatened vegetation that may be found within or near the former COGR area. The Oregon Fish and Wildlife and the U.S. Fish and Wildlife have been contacted to provide specific information about the site. The chart below lists the endangered or threatened species in the area.



<b>Endangered or Threatened Wildlife</b>	<b>Threatened Vegetation</b>
Columbian White-Tailed Deer Brown Pelican Tui Chub	None identified in ASR

- The northern and southern air-to-ground target areas are near Hutton Springs, which is the sole habitat of the Tui Chub. The Tui Chub is classified as a threatened subspecies by the U.S. Fish and Wildlife Service. Several species of migratory birds, including the Snowy Plover, also inhabit springs and lakes in the vicinity on a seasonal basis.
- There are no known archeological or paleontological sites located within the range, according to records of past interviews with State Historical Preservation Office (SHPO) personnel (as documented in the ASR). The SHPO is being contact to provide up-to-date information on the site.

## **Air**

- The nearest individual is approximately 10 miles from the two air-to-ground targets. The town of Lakeview is approximately 35 miles from the two target areas and approximately 5 miles west of the boundary of the FUDS.

# *Conceptual Site Model*

*Site Inspection  
Central Oregon Gunnery Range*

*Technical Project Planning Meeting  
July 11, 2006*

## Overview

A site-specific CSM summarizes available site information and identifies relationships between exposure pathways and associated receptors. A CSM is used to determine the data types necessary to describe site conditions and quantify receptor exposure, and discusses the following information:

- Current site conditions and future land use;
- Potential contaminant sources (e.g., lead projectiles in an impact berm);
- Affected media;
- Governing fate and transport processes (e.g., surface water runoff and/or groundwater migration);
- Exposure media (i.e., media through which receptors could contact site-related contamination);
- Routes of exposure (e.g., inhalation, incidental ingestion, and dermal contact); and
- Potential human and/or representative ecological receptors at the exposure point. Receptors likely to be exposed to site contaminants are identified based on current and expected future land uses.

The CSM is evaluated for completeness and further developed as needed through TPP meetings. Based on a review of documents and the discussion during the TPP meeting, the following MRS was identified within the COGR FUDS:

- Air-to-Air Gunnery Range.

This MRS includes the air-to-ground gunnery targets located near Alkali Lake. The following presents the CSM for the COGR FUDS.

## **Conceptual Site Model – Air-to-Air Gunnery Range MRS**

The CSM evaluates potential exposure pathways related to range operation and configuration relative to physical features and land use. Based on the CSM, sampling schemes are proposed for each area to evaluate potential human health and ecological impacts. Historical photos of the ranges (if available) are carefully examined for possible disturbances or other site features of interest in order to focus the efforts on areas where MC contamination is most likely to occur.

While the MRS is termed the Air-to-Air Gunnery Range, there were two primary uses for the MRS. These were air-to-air gunnery training that occurred over much of the 795,000-acre site and the air-to-ground gunnery training that was focused on two targets located on the eastern border of the MRS adjacent to Alkali Lake. Figure 2 shows the location of the target areas. There was also a reported use of the MRS for ground-to-air gunnery practice and machine gun and rocket firing in 1943, about the time of the Northwest Maneuvers. The location of the ground-to-air gunnery training and machine gun and rocket firing is not known, other than it was near Alkali Lake.

### **Current and Future Land Use**

- Currently, the site is used primarily for livestock grazing.
- Use of the range for agricultural purposes (i.e., grazing and farming) will likely continue into the foreseeable future.

### **Potential Contaminant Sources – Air-to-Air Gunnery Range MRS**

- The ASR identified that the MRS was used for air-to-air and air-to-ground gunnery practice. The air-to-air portion would have used towed targets. No target remnants have been reported. The air-to-ground practice is supported by the wooden targets on the southern and northern target areas. The ASR also reported that the site was used for ground-to-air gunnery practice, but no aerial targets were found. The ground-to-air practice may have been only during the Northwest Maneuvers in 1943.
- One newspaper report also stated that machine gun training and the firing of rockets was done in 1943 near Alkali Lake. The specific location is unknown.
- DoD records indicate that small arms and medium caliber munitions were used at the FUDS. Predominantly, .50-caliber, and 20-mm ammunition were used.
- The only MEC reported was a belt of live .50-caliber ammunition that was found in the northern part of the FUDS (Figure 3).
- The .50-caliber rounds had tracers that may have contained perchlorate.

### **MEC Evaluation**

#### **Types of MEC**

- Potential MEC within the Air-to-Air Gunnery Range MRS are .50-caliber and 20-mm ammunition. An explosive hazard from MEC is not expected.

### **Surface Exposure Pathway**

- The potential route of human exposure to MEC or munitions debris includes direct contact by vehicles, foot traffic, or handling. This would include BLM and ranch workers.
- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by directly walking on them.

### **Subsurface Exposure Pathway**

- The potential routes of human exposure to MEC or munitions debris would be by intrusive drilling or digging activities. This includes BLM and ranch workers.
- The potential route of livestock and wildlife exposure to MEC or munitions debris would be by burrowing activities.

An analysis of the exposure pathways and receptors for MEC is provided in Table 2.

### **MEC Evaluation/Investigation Needed**

- No visual reconnaissance surveys will be completed within the air-to-air gunnery range because of the expansive area to be surveyed (1,242 square miles).
- A visual (magnetometer assisted) reconnaissance survey will be completed at two air-to-ground gunnery range target areas. This survey will be completed to locate MEC or evidence of MEC and to clear soil and sediment sampling sites.

### **MC Evaluation**

#### **Types of MC**

- The anticipated MC at the COGR is lead and steel from projectiles and brass from cases.
- The propellants were either single base or double base type. However, the munitions were fired from aircraft and any residue from the firing would be distributed over a wide area because of dispersion in the air.
- Tracers were used in the .50-caliber rounds, potentially perchlorate containing.

#### **Overview of Pathways**

Affected media and potential pathways for MC include:

- **Soil:** At the COGR, soil is the primary medium of concern because of possible MC in the soil from training activities. The soil also serves as a secondary source of potential air, sediment/surface water, or groundwater contamination.
- **Sediment/Surface Water:** Surface water may act as a migration pathway to humans and ecological receptors from potential sources in soils and sediments. Accumulation of metals in the sediments in pond and lake bottoms may occur. There is no developed surface water drainage between the ponds and lakes and high evaporation rates in the summer reduce the size of the ponds and lakes in the summer.

- **Groundwater:** Groundwater is not considered a potentially affected media since the basalt bedrock is at or very near the surface, which restricts surface water to groundwater migration. Additionally, the high surface water evaporation rates during the summer would also minimize the downward flow of precipitation.
- **Air:** Air is a potential medium of concern due to the possibility of inhalation of contaminated soil particles. However, air is not an affected media under current land use, thus the pathway is incomplete.

Exposure media at the COGR include soil and sediment/surface water. A pathway evaluation for each media is discussed below and provided in Table 2.

Figure 4 illustrates the conceptual site model for the Air-to-Air Gunnery Range and potential pathways of MC contamination.

## **Soil Exposure Pathway**

### **Exposure Routes**

- The potential routes of human exposure to contaminated soils include incidental ingestion of and dermal contact with contaminated media, as well as inhalation of soil particulates during intrusive work.
- The potential routes of livestock and wildlife exposure to contaminated soils include ingestion of and direct contact with contaminated media. Plants may uptake MC and then subsequently be eaten by livestock and wildlife. Burrowing animals may ingest MC-contaminated soil and subsequently be eaten by predators.

### **Receptors**

- Workers (BLM and ranch workers).
- Livestock and wildlife.

### **MC Soil Evaluation/Investigation Needed**

- Three soil samples are proposed to be collected from each of the two target areas near Alkali Lake.
- Samples to be analyzed for select metals (aluminum, chromium, copper, iron, lead, manganese, molybdenum, and nickel). Projectiles from the 50-caliber and 20-mm munitions are made from steel. The above list of metals for analysis was developed from the expected common components of steel (aluminum, chromium, copper, iron, lead, manganese, molybdenum, and nickel).
- No soil samples will be collected from the larger air-to-air gunnery range because of the size and inability to focus on one specific area to sample.

## **Sediment/Surface Water Exposure Pathway**

### **Exposure Routes**

- The potential routes of human exposure to contaminated sediment/surface water include incidental ingestion and dermal contact with surface water.

- The potential routes of livestock and wildlife (including aquatic organisms) exposure to contaminated sediment/surface water include ingestion of and direct contact with surface water present at or near the MRS.

### **Receptors**

- Workers (BLM and ranch workers).
- Livestock and wildlife.

### **MC Sediment/Surface Water Evaluation/Investigation Needed**

- One sediment sample will be collected from ponds or lakes located near each of the two target areas.
- If water is present in the ponds or lakes sampled near the target areas, water samples will be collected.
- Sediment samples to be analyzed for select metals (aluminum, chromium, copper, iron, lead, manganese, molybdenum, and nickel).
- Water samples to be analyzed for select metals (aluminum, chromium, copper, iron, lead, manganese, molybdenum, and nickel) and perchlorate.

### **Data Gaps**

- SI being performed for the COGR will identify MEC and MC impacts to soil and sediments/surface water at the former range.
- The presence of MEC has been established at the COGR by the discovery of a .50-caliber ammunition belt in the northern portion of the MRS. The likely source was from being dropped from aircraft flying over the area.
- No other MEC has been reported.

Results of the current status of data requirements with respect to MEC and MC for the AOCs located at the former COGR are summarized below:

<b>AOC</b>	<b>Presence of MEC</b>	<b>Presence of MC</b>	<b>Proposed Inspection Activities</b>
Air-to-Air Gunnery Range (includes air-to-ground and ground-to-air uses)	Established, but only one documented occurrence	Unknown	Collect soil and sediment samples at target areas to determine presence of MC

# ***Proposed Sampling Scheme***

***Site Inspection  
Central Oregon Gunnery Range***

***Technical Project Planning Meeting  
July 17, 2006***



## **Proposed Field Investigation**

The proposed field investigation sampling to be conducted at the former COGR is detailed below. The investigation approach will be defined in more detail in a SSWP that will be submitted to ODEQ and other stakeholders for review. The SSWP will reference technical details including sampling and analytical methods that are described in the Type I Work Plan, Site Inspections at Multiple Sites, prepared by Shaw and submitted to USACE as final in February 2006.

### **Reconnaissance**

A visual reconnaissance of the air-to-ground target areas will be performed prior to any sampling. Although MEC is not expected to be present on the land surface, a magnetometer-assisted, visual inspection will be conducted by a qualified unexploded ordnance (UXO) technician at suspect locations within the AOC. A global positioning system (GPS) will be used to record discovered MEC, munitions debris, and sample point locations. Digital photographs will be taken to document significant features.

### **Soils**

Proposed SI sampling at the two air-to-ground target areas will consist of the collection of six composite surface soil samples. Three soil samples will be collected near each of the two targets. Surface soil samples will be composite samples (7-point, wheel pattern with 2-ft radius). The proposed sampling for the COGR is summarized in Table 3.

### **Sediment/Surface Water**

One sediment sample will be collected near each of the two air-to-ground gunnery range targets. Sediment samples will be discrete grab samples. If water is present, one surface water grab sample will be collected from the ponds or lakes sampled for sediment near each of the target areas. The proposed sampling for the COGR is summarized in Table 3.

### **Analyses**

Each soil sample will be analyzed for select metals (aluminum, chromium, copper, iron, lead, manganese, molybdenum, and nickel) by USEPA SW-846 Method 6020A. Sediment samples will also be analyzed for the same metals by Method 6020A. Soil and sediment samples may have been impacted by small arms fire; samples will be passed through an ASTM No. 10 (2-mm) wire mesh sieve at the laboratory prior to analysis for metals in order to remove coarser particles and foreign objects, including large metallic fragments from bullets, which have a low degree of bio-availability (Interstate Technical and Regulatory Council, 2003, *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges*).

The water samples will be analyzed for select total and dissolved metals and perchlorate by USEPA SW-846 Methods 6020A and 6850, respectively.

### **Background Sampling**

Ten background soil, three background sediment, and one background surface water samples will be collected. The composite sample locations will be determined in the field in areas that do not appear to be have been impacted by past site operations. The soil background samples will be used to develop an upper tolerance limit for comparison of metals soil concentrations at the target areas. The background sediment and water sample data will provide data to compare sediment and water samples to background values. The proposed background sampling is summarized in Table 3.

# *TPP Notes and Data Quality Objectives*

*Site Inspection  
Central Oregon Gunnery Range*

*Technical Project Planning Meeting  
July 17, 2006*

## Technical Project Planning and Development of Data Quality Objectives

- The USACE TPP process is a four-phase process:
  - Identify the current project,
  - Determine data needs,
  - Develop data collection options, and
  - Finalize data collection program.
- The purpose of TPP is to develop DQOs that document how the project makes decisions.
- DQOs are intended to capture project-specific information such as the intended data use(s), data needs, and how these items will be achieved.
- Information captured through DQOs will be used as a benchmark for determining whether identified objectives are met.

## TPP Phases

### Phase I: Identify the Current Project

1. Team members identified to date include: USACE – representatives from the Omaha Design Center and the Seattle District, Shaw as a USACE contractor, ODEQ, BLM, and USEPA Region 8.

**Question: Is there any person or organization missing from this Team?**

2. The one MRS is identified as:

- Air-to-air gunnery range, including the air-to-ground and ground-to-air gunnery ranges.

The ASR Supplement identified the air-to-ground gunnery range as the only MRS. However, the air-to-ground range was included in it. The locations of the air-to-air and air-to-ground gunnery ranges are known. Location of the suspected ground-to-air gunnery range is unknown. The air-to-air gunnery range is known to contain MEC, based on a find of a .50-caliber ammunition belt in 1990. MEC has not been located air-to-ground target area. Munitions debris (cartridge casings) have been identified at the air-to-ground gunnery range. A RAC score of 4 was assigned to the site. Records indicate that only .50-caliber and 20-mm ammunition were used at the site. Records indicate that the range was used on a daily basis.

**Question: Are there any other AOCs to be identified?**

Does it make sense to separate the air-to-ground range from the air-to-air range?

Is there sufficient evidence that there was a ground-to-air range use at the FUDS and where was it located?

3. Based on information available about the site and shared through discussions with USACE, concerns about this area have been expressed by the ODEQ or USEPA, as well as by landowners.

**Question: Are there additional concerns or issues from landowners or other stakeholders regarding the COGR area?**

Field work must be performed during the months of mid-May to November because of the likelihood of snow cover in the other months.

**Question: Are there any administrative or stakeholder concerns or constraints that would prevent site inspection activities from going forward on the decision path for this site?**

**Phase II: Determine Data Needs**

4. Existing site information includes an ASR and ASR Supplement both prepared by the USACE in 1995 and 2004, respectively.

**Question: Are there any other pertinent documents relating to the site available?**

5. The site-specific approach for this SI involves collating and assessing available site information, to include site geology, hydrogeology, groundwater, surface water, ecological information, human use/access, and current and future land uses; as well as considering conduct of site inspection and sampling activities.

**Question: Are there any other site aspects/information that should be considered?**

6. Based on prior site investigations, soil is the primary affected medium at the COGR. Sediment/Surface water is a potential pathway of MC because of the existence of livestock grazing in the area. Air is also a potential pathway if soil particles become airborne. Considering current and future land use, primary receptors of any contaminants that may be present would most likely be individuals and animals using the area for ranching and grazing.

**Question: Do team members concur with the CSM?**

- **MEC and MC will only be evaluated in the air-to-ground target areas.**
- **MC contaminants of concern are metals.**
- **Exposure pathways are through soils and sediments/surface water.**

7. Technical considerations and/or constraints need to be identified and addressed before conducting any additional sampling, and would depend on the approach and additional data needs decided upon by team members.

**Questions:**

- **Are any data missing?**
- **What is the nature of needed data?**
- **What information is necessary to support a decision of No Department of Defense Action Indicated (NDAI) or further action with regards to MEC. Is reconnaissance during the SI, together with the historical record of a munitions clearance at the time of range closure and a period of approximately 60 years without known MEC-related incidents considered sufficient to determine the need for NDAI versus further action with respect to MEC.**
- **What data gaps would additional data meet for making a decision about the site?**
- **Are there any considerations/constraints that need to be addressed for collecting additional data?**

### **Phase III: Develop Data Collection Options**

8. Proposed approach:
  1. Conduct surface reconnaissance in the air-to-ground gunnery range MRS.
  2. Find suitable soil background sample locations (3 total) and sample.
  3. Find suitable sediment background sample location (1 total) and sample.

4. Collect three composite soil samples from the each of the two air-to-ground gunnery range targets and analyzed for select metals (aluminum, chromium, copper, iron, lead, manganese, molybdenum, and nickel).
5. Collect sediment sample from two ponds near target areas and analyze for select metals.

**Question: Are the stakeholders in agreement with the sampling approach program?**

**Question: Are the stakeholders in agreement with the proposed approach for collecting background data?**

#### **Phase IV: Finalize Data Collection Program**

9. What concentrations of PCOCs (metals and explosives) lead to decision end-points?  
Note: Oregon state standards are provided in Tables 4, 5, and 6.

**Question: Are these the correct standards to be applied as screening values for human health and ecological risk assessment?**

**Question: Are there any additional sampling and analysis methodologies needed for all team members to arrive at a decision end-point?**

**Question: Given the additional sampling and analysis methodologies, are there impacts to the project schedule that need to be accommodated?**

## **Data Quality Objectives**

Upon agreement at the TPP meeting, the following decision rules will be applied with regard to MC sampling results:

- Below risk-based screening levels = NDAI;
- Above risk-based screening levels and background = RI/FS.

The following expanded project objectives have been developed.

**Objective 1: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MEC.**

DQO #1 – Utilizing trained UXO personnel and handheld magnetometers, a visual search of the air-to-ground gunnery range will be conducted searching for physical evidence to indicate the presence of MEC (ammunition belts, MEC on the surface, munitions debris, and soil discoloration indicative of explosives). The visual search will consist of a meandering path survey along trails and in accessible areas. The following decision rules will apply:

- The following reconnaissance results would support a recommendation for further action with respect to MEC:
  - Direct evidence is found of the presence of MEC, other than incidental small and medium arms rounds, or evidence of potential MEC that is inconsistent with the air-to-ground gunnery range CSM (e.g., debris from munitions other than small and medium arms).
  - Direct evidence of MEC is not found, but abundant munitions debris and/or magnetic anomalies, other than from small or medium arms, are identified suggesting a potential for the presence of unexploded spotting charges or other MEC.
- The following reconnaissance results would support a recommendation for NDAI with respect to MEC:
  - Direct evidence of MEC is not found; isolated munitions debris and/or magnetic anomalies consistent with the air-to-ground gunnery range CSM are identified.
  - No evidence of MEC, munitions debris, or magnetic anomalies are identified.
- If there is indication of an imminent MEC hazard, the site may be recommended for a time-critical removal action.

**Objective 2: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MC above screening values.**

DQO#2 – Soil and sediment samples will be collected and analyzed as proposed in Table 3. Analytical results will be compared to screening values for human health and ecological risk assessment, and to background values for naturally occurring substances. The following decision rules will apply:

- If sample results are less than human health and ecological screening values, the site will be recommended for NDAI relative to MC.



- If sample results exceed both human health screening values and background values, the site will be recommended for additional investigation.
- If sample results do not human health screening values but do exceed both ecological screening values and background values, additional evaluation of the data will be conducted in conjunction with the stakeholders to determine if additional investigation is warranted.

**Objective 3: Obtain data required for HRS scoring.**

Data required for HRS scoring are identified in the HRS Data Gaps worksheet.

**Objective 4: Obtain data required for MRSPP ranking.**

Data required for MRSPP ranking are identified in the MRSPP worksheet.

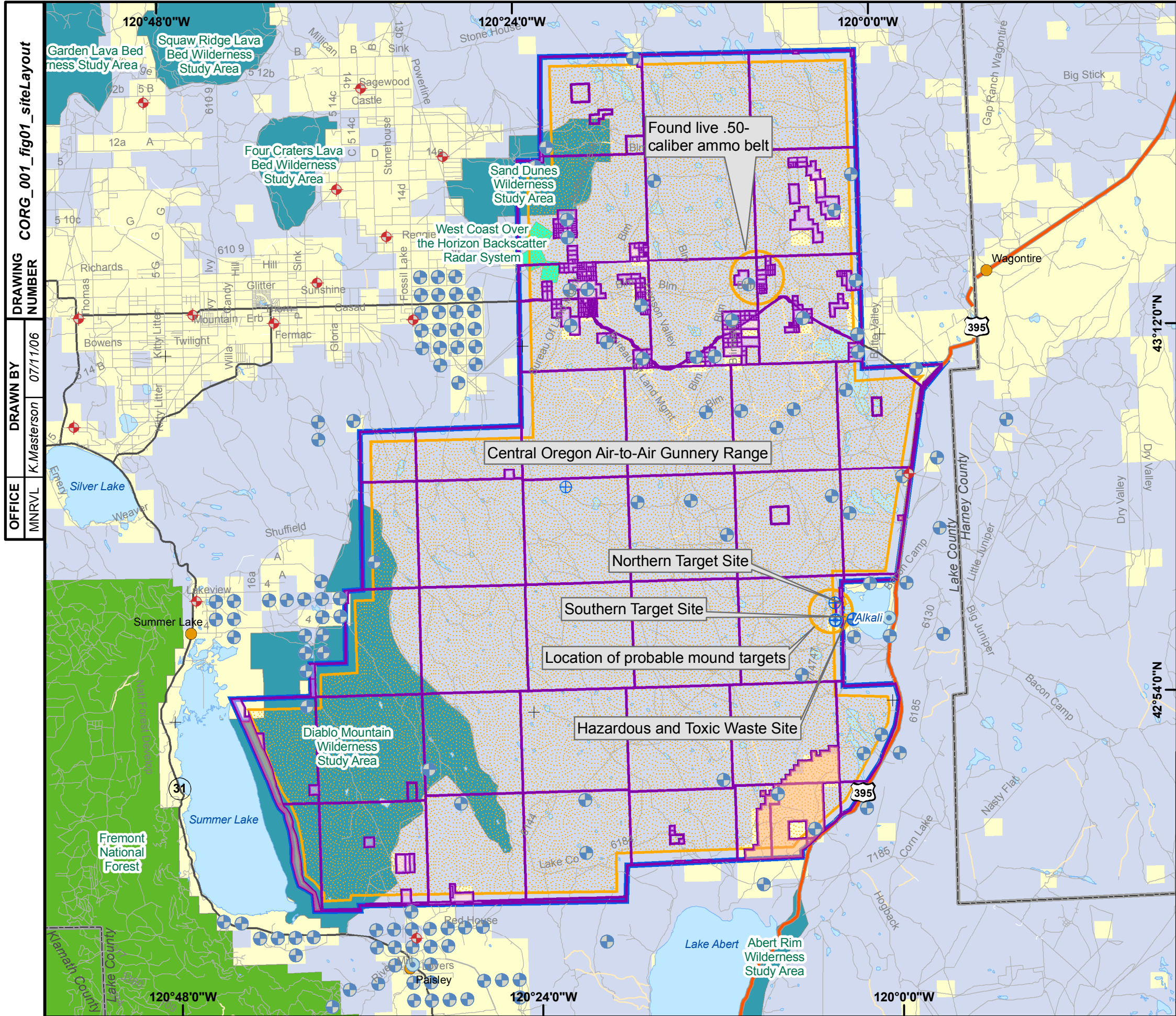
## **Next Steps**

- Scheduling of a 2nd TPP meeting will occur as agreed upon by team members.
- Shaw will prepare the TPP Memorandum and distribute for concurrence.
- Shaw will prepare the SSWP for review and comment.
- USACE will obtain necessary ROEs.
- Shaw will collect samples.
- Shaw will prepare the SI Report.

# *Figures*

*Site Inspection  
Central Oregon Gunnery Range*

*Technical Project Planning Meeting  
July 17, 2006*



**Legend**

- Central Oregon Gunnery Range Property Boundary
- Central Oregon Air-to-Air Gunnery Range - Area of Concern
- Taxlot Parcel
- Private Land
- STATE OF OREGON
- Air Force DOD
- National Forest FS
- Public Domain Land BLM
- Wilderness Study Area BLM
- Geotechnical Well
- Monitoring Well
- Water Supply Well
- Well (Water Resources Dept)

**NOTES:**

- 1) MRA/MRS boundary was derived from the Central Oregon Gunnery Range ASR Supplement.
- 2) Groundwater well data were obtained from Oregon State Water Resources Dept and approximated to the nearest 1200 meters.
- 3) These ranges are located within the Summer Lake and Lake Abert watersheds.

0 2.5 5 Miles

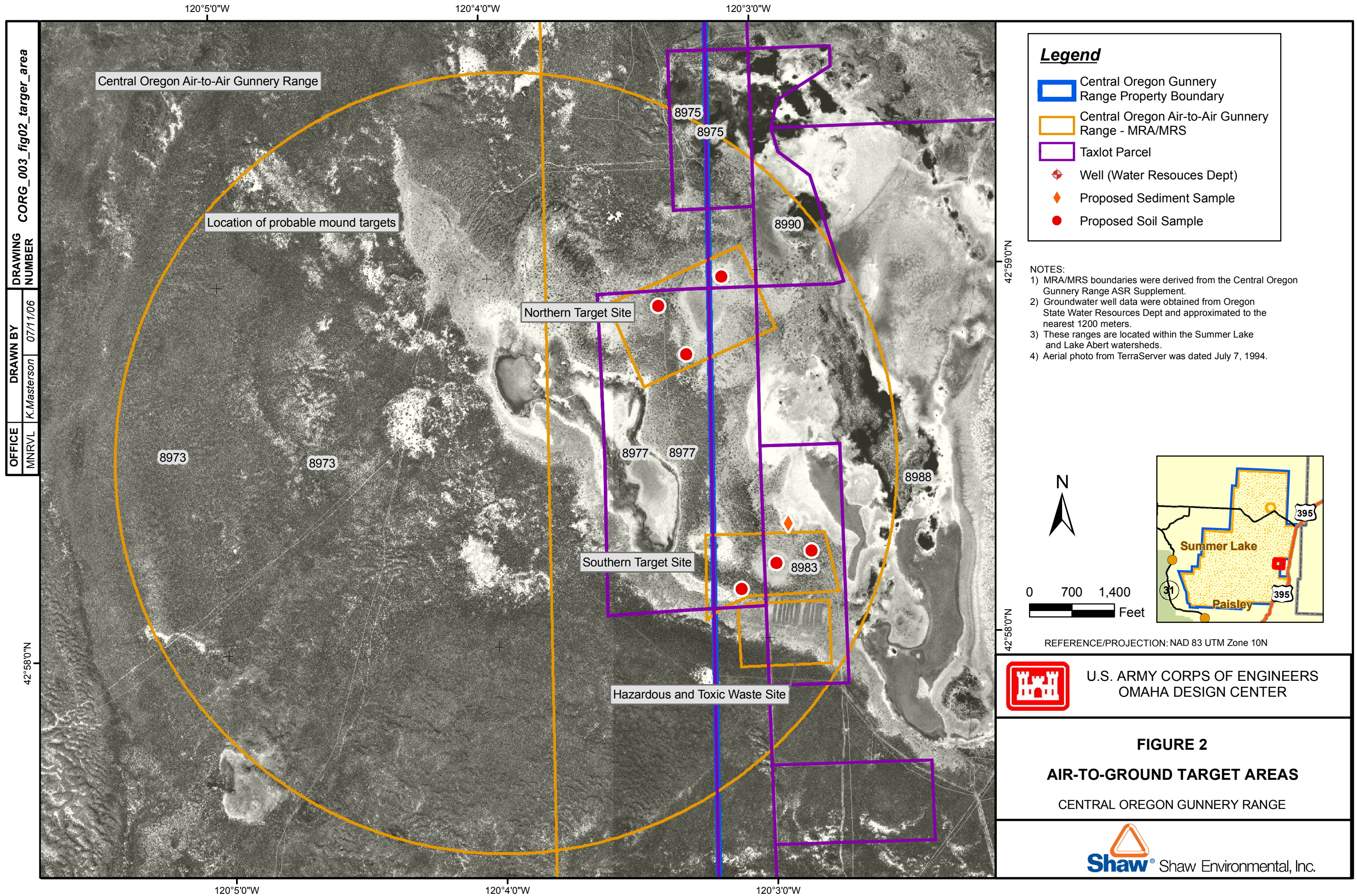
REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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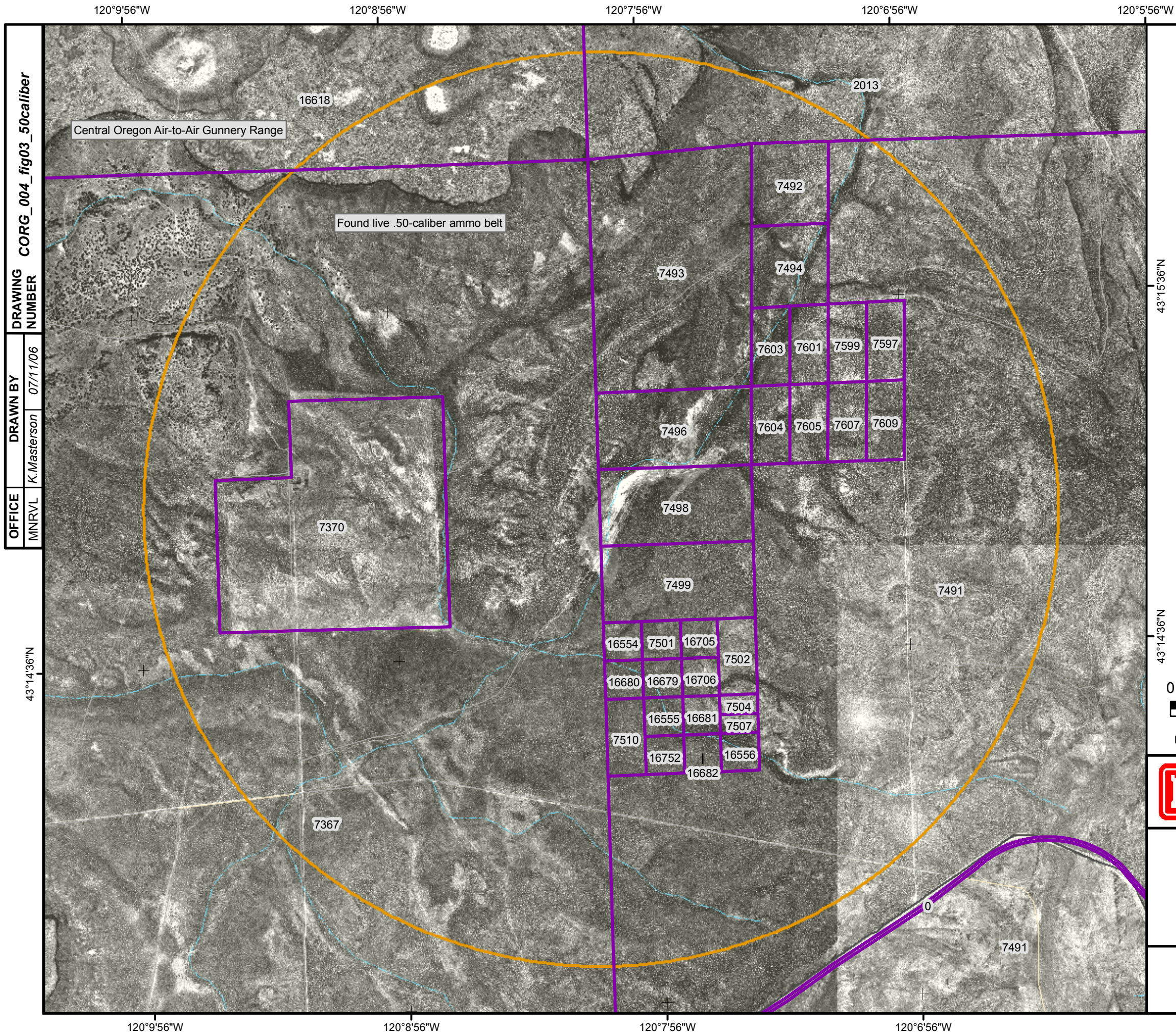
**FIGURE 1**  
**SITE LAYOUT**  
CENTRAL OREGON GUNNERY RANGE

Shaw Environmental, Inc.









**Legend**

Central Oregon Gunnery Range Property Boundary

Central Oregon Air-to-Air Gunnery Range - MRA/MRS

Taxlot Parcel

NOTES:  
1) MRA/MRS boundary was derived from the Central Oregon Gunnery Range ASR Supplement.  
2) Groundwater well data were obtained from Oregon State Water Resources Dept and approximated to the nearest 1200 meters.  
3) These ranges are located within the Summer Lake and Lake Abert watersheds.  
4) Aerial photo from TerraServer dated July 11, 1994.

N

09501,900

Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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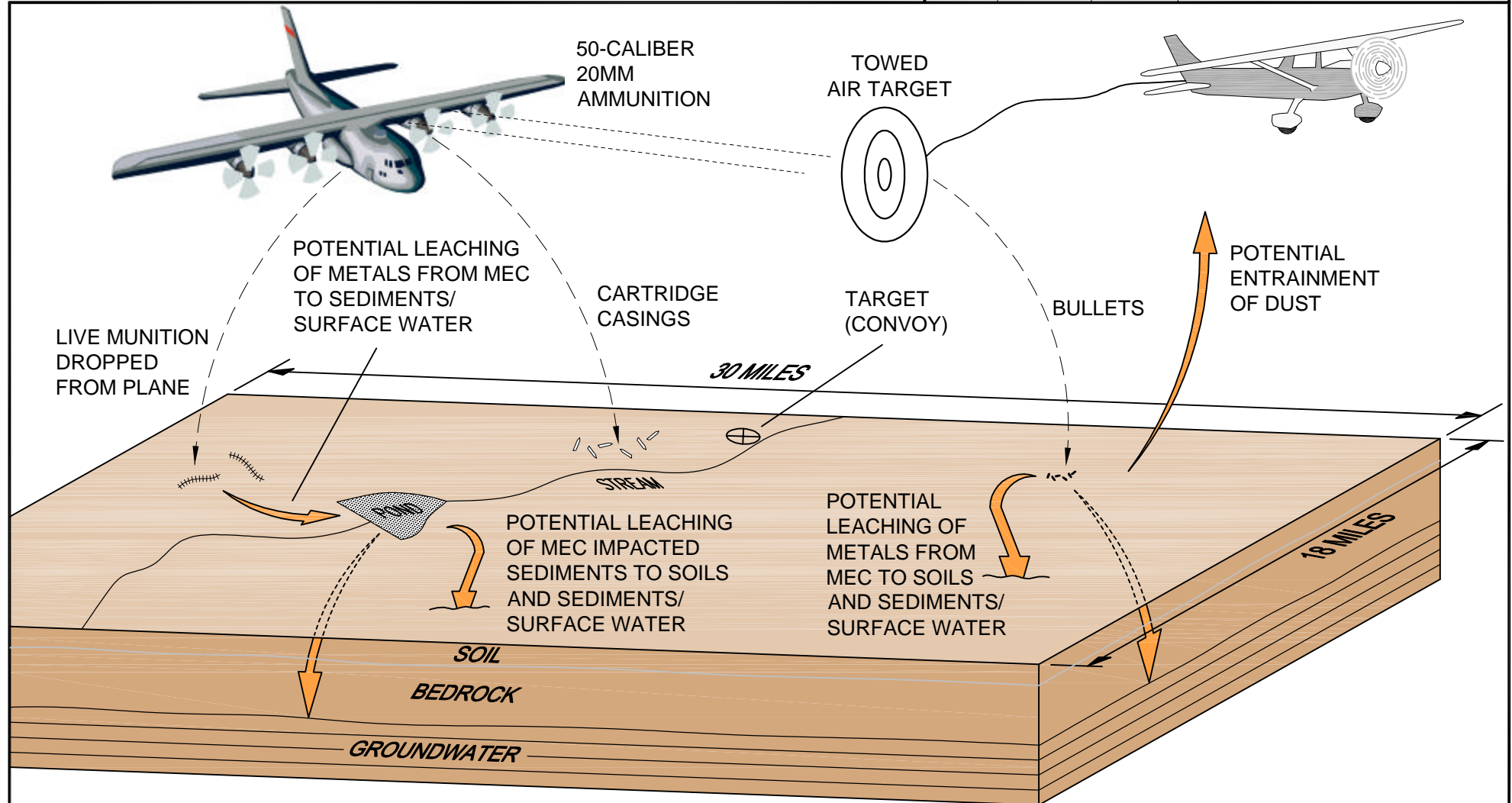
**FIGURE 3**  
**LOCATION OF .50 CALIBER**  
**AMMUNITION BELT FIND**  
CENTRAL OREGON GUNNERY RANGE

Shaw® Shaw Environmental, Inc.



OFFICE	DRAWN BY	DRAWING NUMBER
SJ	K. Black	7-7-06

116188SJ-A52

**RECEPTORS:**

- BLM Workers/Ranch Workers
- Local Residents
- Biota (Wildlife/Livestock)



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FIGURE 4  
CONCEPTUAL SITE MODEL  
AIR-TO-AIR AND AIR-TO-GROUND  
GUNNERY RANGES  
CENTRAL OREGON GUNNERY RANGE



Shaw Environmental, Inc.

# *Tables*

*Site Inspection*  
*Central Oregon Gunnery Range*

*Technical Project Planning Meeting*  
*July 17, 2006*

**Table 1**  
**Potential MEC and MC at Central Oregon Gunnery Range**

<b>MRS</b>	<b>Munitions</b>	<b>Munitions Constituents</b>	<b>Land Use Controls</b>
Air-to-Air Gunnery Range	50-caliber machine gun	Lead, single(nitrocellulose)- or double-base (nitrocellulose and nitroglycerin) propellant, perchlorate	No
	20-mm ball M55A1, MK1	Steel double-base (nitrocellulose and nitroglycerin) propellant	No



**Table 2**  
**MEC and MC Exposure Pathway Analysis**

Range Area & Type	MMRP Concern	Potential Contaminant of Concern (PCOCs)	Affected Media (Potential Contaminant Sources) (Fate and Transport)	Exposure Routes and Potential Receptors			Data Gaps	Activities to Address Data Gaps (i.e., Sampling)
				Site Workers/ Contractor Personnel	Residents/ General Public	Ecological (Livestock & Biota)		
Air-to-Air Gunnery Range & Air-to-Ground Gunnery Range	MEC	MEC in the form of unfired .50-caliber and 20-mm ammunition may exist within the 795,000-acre range and two target areas.	<b>Surface Soil</b> <ul style="list-style-type: none"> <li>MEC (unfired ammunition) are a hazard.</li> <li>MEC found on surface.</li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> <li>Exposure routes: <ul style="list-style-type: none"> <li>Vehicle &amp; foot traffic.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> <li>Exposure routes: <ul style="list-style-type: none"> <li>Vehicle &amp; foot traffic.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> <li>Exposure routes: <ul style="list-style-type: none"> <li>Foot traffic.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>None - MEC reported</li> </ul>	Air-to-Air Gunnery Range <ul style="list-style-type: none"> <li>None; very low likelihood of finding MEC over the 795,000-acre site.</li> </ul> Air-to-Ground Gunnery Range <ul style="list-style-type: none"> <li>Visual (magnetometer assisted) reconnaissance of the two target areas.</li> </ul>
			<b>Subsurface Soil</b> <ul style="list-style-type: none"> <li>none</li> </ul>	<ul style="list-style-type: none"> <li>Incomplete pathway.</li> </ul>	<ul style="list-style-type: none"> <li>Incomplete pathway.</li> </ul>	<ul style="list-style-type: none"> <li>- NA.</li> </ul>	<ul style="list-style-type: none"> <li>None subsurface burial not documented</li> </ul>	<ul style="list-style-type: none"> <li>Historical documents does not indicate ranges have buried MEC.</li> </ul>
	MC	Metals from 0.50-caliber and 20-mm munitions used on ranges	<b>Soil</b> <ul style="list-style-type: none"> <li>Directly affected media.</li> <li>Potential metals and explosives contamination ranges.</li> <li>Fate &amp; Transport: secondary source of potential surface water, sediment, and air contamination.</li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> <li>Exposure routes: <ul style="list-style-type: none"> <li>Incidental ingestion,</li> <li>Dermal contact, and</li> <li>Inhalation of soil particulates during intrusive work.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> <li>Exposure routes: <ul style="list-style-type: none"> <li>Ingestion, and</li> <li>Direct contact by area fauna and livestock.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Analytical data for metals in soil does not exist.</li> <li>Field data for Screening Level Ecological Risk Assessment do not exist.</li> </ul>	Air-to-Air Gunnery Range <ul style="list-style-type: none"> <li>None, very low likelihood of finding impacted soil over the 795,000-acre site.</li> </ul> Air-to-Ground Gunnery Range <ul style="list-style-type: none"> <li>A total of 6 composite soil samples will be collected near each target area.</li> <li>Soil samples will be analyzed for metals.</li> </ul>
			<b>Sediment/Surface Water</b> <ul style="list-style-type: none"> <li>Potentially affected media – ponds and lake.</li> <li>Potential metal contamination.</li> <li>Fate &amp; Transport: via surface runoff from impacted soil.</li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> <li>Exposure routes: <ul style="list-style-type: none"> <li>Incidental ingestion,</li> <li>Dermal contact, and</li> <li>Inhalation of surface water.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> </ul>	<ul style="list-style-type: none"> <li>Potentially complete pathway.</li> <li>Exposure routes: <ul style="list-style-type: none"> <li>Ingestion,</li> <li>Direct contact by area fauna and livestock, and</li> <li>Direct contact by aquatic organisms.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Analytical data for metals in sediment/surface water does not exist.</li> <li>Field data for Screening Level Ecological Risk Assessment do not exist.</li> </ul>	Air-to-Air Gunnery Range <ul style="list-style-type: none"> <li>None; very low likelihood of finding impacted sediment/surface water over the 795,000-acre site.</li> </ul> Air-to-Ground Gunnery Range <ul style="list-style-type: none"> <li>Two sediment samples will be collected from nearby ponds.</li> <li>Samples will be analyzed for metals.</li> </ul>
			<b>Groundwater</b> <ul style="list-style-type: none"> <li>Potentially unaffected media.</li> <li>Potential metals contamination.</li> <li>Fate &amp; Transport: migration of metals directly to groundwater is unlikely due to relatively low mobility of lead in soil and the very near surface bedrock.</li> </ul>	<ul style="list-style-type: none"> <li>Incomplete pathway. <ul style="list-style-type: none"> <li>No local wells</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Incomplete pathway. <ul style="list-style-type: none"> <li>No local wells</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Incomplete pathway. <ul style="list-style-type: none"> <li>No local wells</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>No groundwater analytical data exist for metals.</li> </ul>	<ul style="list-style-type: none"> <li>No groundwater samples will be collected.</li> </ul>
			<b>Air</b> <ul style="list-style-type: none"> <li>Not an affected media under current land use.</li> </ul>	Incomplete Pathway	Incomplete Pathway	Incomplete Pathway	None	None

**Table 3**  
**Proposed Sampling Approach**

MRS	Media	Contaminants of Concern		Comments
		Metals *	Perchlorate	
<b>Air-to-Air Gunnery Range</b>	Soil	--	--	No sampling; very low likelihood of finding impacted soil over the 795,000-acre site.
	Sediment	--	--	No sampling; very low likelihood of finding impacted soil over the 795,000-acre site.
<b>Air-to-Ground Gunnery Range</b>	Soil	6	--	MC not previously assessed. Composite soil samples will be collected around the target areas.
	Sediment	2	--	Sediment sample will be collected from nearby ponds.
	Surface Water	2	2	Surface water will be collected from nearby ponds if water is present.
<b>Background</b>	Soil	10	--	A series of background samples will be collected in area undisturbed by past operations to establish a baseline for metals.
	Sediment	3	--	
	Surface Water	1	1	
<b>Sample Totals</b>		24	3	

Notes:

\* Metals to be analyzed include aluminum, chromium, copper, iron, lead, manganese, molybdenum, and nickel.

Quality control samples will be addressed in the SSWP.

MRS = Munitions Response Site

Surface soil samples are composite samples (7-point, wheel pattern with 2-foot radius). All other samples are discrete grab samples.

**Table 4**  
**Human Health Screening Criteria for Soil/Sediment at Oregon Sites**

Analyte	Abbreviation	CAS No.	Region 9 Human Health Screening Values <sup>a</sup>			Laboratory Method Detection Limit (mg/kg)
			Residential PRG <sup>b</sup> (mg/kg) <sup>b</sup>	SSLs <sup>c</sup> DAF=1 (mg/kg)	SSLs <sup>c</sup> DAF=20 (mg/kg)	
Aluminum	Al	7429-90-5	76,000			20.0
Chromium <sup>c</sup>	Cr	7440-47-3	210	2	38	1.0
Copper	Cu	7440-50-8	3,100			1.0
Iron	Fe	7439-89-6	23,000			15.0
Lead	Pb	7439-92-1	400 <sup>d</sup>			1.0
Manganese	Mn	7439-96-5	1,800			25.0
Molybdenum	Mo	7439-98-7	390			0.06
Nickel	Ni	7440-02-0	1,600	7	130	1.0

Notes:

DAF = Dilution Attenuation Factor.

PRG = Preliminary Remediation Goal.

SSL = Soil Screening Level.

mg/kg = milligrams per kilogram.

mg/L = milligrams per liter.

a If laboratory cannot meet any of the preferred QLs with routine SW 846 methodology (as supported by MDLs that are no greater than 1/3 QL), laboratory's QL must be identified in laboratory submittal as failing to meet the QL. Some screening values cannot be obtained with routine methodology to the QL. In those cases, the QL achievable with a routine SW 846 methodology would be accepted.

b PRGs from Region 9 PRG Table dated October 2004 and addendum dated 28 December 2004, based on single chemical.

c SSLs from Region 9 PRG Table dated October 2004 and revision note dated 28 December 2004.

d Values listed from Oregon risk-based concentrations: 400 mg/kg (residential)

**Table 5**  
**Ecological Risk-Based Soil Screening Concentrations for Oregon Sites**

Parameter	ODEQ Level II Screening Level <sup>a</sup>	Proposed Benchmarks									Potential Bio-accumulative Constituent? <sup>h</sup>	Final Ecological Screening Value Soil <sup>i</sup> (mg/kg)	Practical Quantitation Limit (mg/kg)
	Lowest Value for Plants/Inverts./ Birds/Mammals (mg/kg)	Region 5 ESLs <sup>b</sup> (2003) (mg/kg)	Region 7 <sup>c</sup> (mg/kg)	Region 8 <sup>d</sup> (mg/kg)	Region 10 <sup>e</sup> (mg/kg)	Other Values: Talmage et al. (1999) <sup>f</sup> or LANL (2005) <sup>g</sup> (mg/kg)							
Metals/Inorganics													
Aluminum	50	NVA	50	EPA-R4	NVA		50	EPA-R4	5.5	LANL		50	20.0
Chromium (total)	0.4	0.4	26	SSL	26	SSL	26	SSL	2.3	LANL	Yes	0.4	1.0
Copper	50	5.4	60	ORNL	190	Dutch	60	ORNL	10	LANL	Yes	50	1.0
Iron	10	NVA	200	EPA-R4	NVA		200	EPA-R4	NVA			10	15.0
Lead	16	0.0537	11	SSL	11	SSL	11	SSL	14	LANL	Yes	16	1.0
Manganese	100	NVA	100	EPA-R4	NVA		100	EPA-R4	50	LANL		100	0.5
Molybdenum	2	NVA	2	ORNL	2	ORNL	2	ORNL	NVA			2	0.5
Nickel	30	13.6	30	ORNL	30	ORNL	30	ORNL	20	LANL	Yes	30	1.0

a Oregon Department of Environmental Quality Screening Level Values (December 2001).

b Ecological Screening Levels (ESLs), USEPA Region V, August 2003.

c USEPA Region 7: Catherine Wooster-Brown (Eco Risk Assessor) recommends the following hierarchy: USEPA EcoSSLs; ORNL Efroymsen values; USEPA Region 4 values; other published values.

d USEPA Region 8: Dale Hoff (Eco Risk Assessor) recommends the following hierarchy: USEPA SSLs; Dutch Intervention Values or ORNL Efroymsen values.

e USEPA Region 10: Joseph Goulet (Eco Risk Assessor) says Region 10 has no recommended hierarchy, therefore, values from the USEPA Region 7 Approach were used.

f Talmage, S.S., D.M. Opreko, C.J. Maxwell, C.J.E. Welsh, F.M. Cretella, P.H. Reno, and F.B. Daniel, 1999, Nitroaromatic Munition Compounds: Environmental Effects and Screening Values, **'Revisions Environmental Contaminant Toxicology.'**

g Los Alamos National Laboratory (LANL), Eco Risk Database, Release 2.2, September 2005.

h Potential bioaccumulative constituents will be evaluated in more detail, as some screening values do not take into account bioaccumulation. Potential bioaccumulative potential from: Bioaccumulation and Interpretation for the Purposes of Sediment Quality Assessment: Status and Needs (USEPA, 2000) and ODEQ EQSLVs (ODEQ, 2001).

i Final Screening Value selected using the following hierarchy:

1. State Value (Oregon)
2. USEPA Region State Located In (USEPA Region 10)
3. Lower of Talmage, et al. (1999) or LANL (2005) values.

EPA-R4=USEPA Region 4

LANL= Los Alamos National Laboratory

SSL=USEPA Eco Soil Screening Levels

Dutch=Dutch Intervention Values

ORNL= Oak Ridge National Laboratory Ecological PRGs (Efroymson, et al.)

**Other References:**

U.S. Environmental Protection Agency, 2005, Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs), Office of Solid Waste and Emergency Response,

website version last updated March 15, 2005: <http://www.epa.gov/ecotox/ecoss/>

U.S. Environmental Protection Agency, 2001, Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment. Originally published November 1995.

Website version last updated November 30, 2001: <http://www.epa.gov/region4/waste/ots/ecolbul.htm>

Efroymson, R.A., Suter II, G.W., Sample, B.E. and Jones, D.S., 1997. Preliminary Remediation Goals for Ecological Endpoints. Lockheed Martin Energy Systems, Inc. (ORNL) ES/ER/TM-162/R2.

Dutch Intervention Values:

Swartjes, F.A. 1999. Risk-based Assessment of Soil and Groundwater Quality in the Netherlands: Standards and Remediation Urgency. Risk Analysis 19(6): 1235-1249

The Netherlands Ministry of Housing, Spatial Planning and Environment's Circular on target values and intervention values for soil remediation

[http://www2.minvrom.nl/Docs/internationaal/S\\_I2000.pdf](http://www2.minvrom.nl/Docs/internationaal/S_I2000.pdf) and Annex A:

Target Values, Soil Remediation Intervention Values and Indicative Levels for Serious Contamination

[http://www2.minvrom.nl/Docs/internationaal/annexS\\_I2000.pdf](http://www2.minvrom.nl/Docs/internationaal/annexS_I2000.pdf) were also consulted.

**Table 6**  
**Ecological Risk-Based Sediment Screening Concentrations for Oregon Sites**

Parameter	ODEQ Screening Level Values <sup>a</sup> (mg/kg) Freshwater	Region 5 Ecological Screening Levels <sup>b</sup> (mg/kg)	EPA Region 7 <sup>c</sup> (mg/kg)		EPA Region 8 <sup>d</sup> (mg/kg)		EPA Region 10 <sup>e</sup> (mg/kg)		Other Values: Talmage, et al. (1999) <sup>f</sup> or LANL (2005) <sup>g</sup> (mg/kg)		Potential Bio accumulative Constituent? <sup>g</sup>	Final Ecological Screening Value Sediment <sup>h</sup> (mg/kg)	Practical Quantitation Limit (mg/kg)
Metals/Inorganics													
Aluminum	NVA	NVA	NVA		NVA		NVA		2.80E+02	LANL		2.80E+02	20.0
Chromium	3.70E+01	4.34E+01	4.34E+01	MAC	4.34E+01	MAC	4.34E+01	MAC	5.60E+01	LANL	Yes	3.70E+01	1.0
Copper	1.00E+01	3.16E+01	3.16E+01	MAC	3.16E+01	MAC	3.16E+01	MAC	1.70E+01	LANL	Yes	1.00E+01	1.0
Iron	NVA	NVA	NVA		NVA		NVA		2.00E+01	LANL		2.00E+01	15.0
Lead	3.50E+01	3.58E+01	3.58E+01	MAC	3.58E+01	MAC	3.58E+01	MAC	2.70E+01	LANL	Yes	3.50E+01	1.0
Manganese	1.10E+03	NVA	NVA		NVA		NVA		7.20E+02	LANL		1.10E+03	0.5
Molybdenum	NVA	NVA	NVA		NVA		NVA		NVA			NVA	0.5
Nickel	1.80E+01	2.27E+01	2.27E+01	MAC	2.27E+01	MAC	2.27E+01	MAC	3.90E+01	LANL	Yes	1.80E+01	1.0

a Oregon Department of Environmental Quality Screening Level Values (December 2001).

b Ecological Screening Levels (ESLs), U.S.EPA Region V, August 2003.

c USEPA Region 7: Catherine Wooster-Brown (Eco Risk Assessor) recommends the following hierarchy: MacDonald Consensus Values (MacDonald, 2000); ORNL Efroymsen values (ORNL, 1977).

d USEPA Region 8: Dale Hoff (Eco Risk Assessor) recommends the following hierarchy: MacDonald Consensus Values (MacDonald, 2000); Canadian ISQG values (CCME, 2003) or ORNL Efroymsen values (ORNL, 1977).

e USEPA Region 10: Joseph Goulet (Eco Risk Assessor) says Region 10 has no recommended hierarchy, therefore, values from the USEPA Region 7 Approach were used.

f Talmage, S.S., D.M. Opresko, C.J. Maxwell, C.J.E. Welsh, F.M. Cretella, P.H. Reno, and F.B. Daniel (TAL), 1999, Nitroaromatic Munition Compounds: Environmental Effects and Screening Values, **Revisions Environmental Contaminant Toxicology.**

g Los Alamos National Laboratory (LANL), Eco Risk Database, Release 2.2, September 2005.

h Potential bioaccumulative constituents will be evaluated in more detail, as some screening values do not take into account bioaccumulation. Potential bioaccumulative potential from: Bioaccumulation and Interpretation for the Purposes of Sediment Quality Assessment: Status and Needs (USEPA, 2000) and ODEQ EQSLVs (ODEQ, 2001).

i Final Screening Value selected using the following hierarchy:  
1. State Value (Oregon)  
2. USEPA Region State Located In (USEPA Region 10)  
3. Lower of Talmage, et al. [TAL] (1999) or LANL (2005) values.

**Note:** The Talmage [TAL] screening values assume 10% organic carbon in the sediment.

MAC=MacDonald Consensus Values

EPRGs=Oak Ridge National Laboratory Ecological PRGs

ISQGs=Canadian Interim Sediment Quality Guidelines

LALN=Los Alamos National Laboratory

TAL=Talmage, et al. (1999)

**Other References:**

Efroymsen, R.A., et al., 1997, Preliminary Remediation Goals (EPRGs), ORNL, ES/ER/TM-162/R2.

Canadian Interim Sediment Quality Guidelines (ISQGs) Summary Table, CCME, December 2003.

MacDonald, D.D, C.G. Ingersoll and T.A. Berger, 2000, Development and Evaluation of Consensus-Based Sediment Quality Criteria for Freshwater Ecosystems, Archives of Environmental Contamination and Toxicology 39:20-31.

# ***Draft Worksheets***

## ***Site Information Worksheet*** ***MRSP Data Gaps*** ***HRS Data Gaps***

***Site Inspection***  
***Central Oregon Gunnery Range***

***Technical Project Planning Meeting***  
***July 17, 2006***

## Site Information Worksheet

Site: Air-to-Air Gunnery Range

Project: Central Oregon Gunnery Range

	Site Information Needed <sup>a</sup>	Suggested Means to Obtain Site Information	Potential Source(s) of Site Information	Responsible for Obtaining	Deadline for Obtaining Site Information
1	Use existing background values from work being performed nearby	ODEQ protocol	ODEQ will determine	ODEQ	For inclusion in TPP Memo
2	Background sampling requirements for metals	ODEQ protocol	ODEQ guidance document	ODEQ	For inclusion in TPP Memo
3	Background metals data	Sampling	Add more samples to field program	Shaw	For inclusion in TPP Memo
4	Schedule for sampling Oregon sites	Consultation	BLM	Shaw	Prior to field work
5	Additional historical information	Records review	USACE Seattle and Portland Districts	Shaw	For inclusion in Site Specific Work Plan
6	Oregon HH Screening Standards	ODEQ regulations	ODEQ	Shaw	For inclusion in TPP Memo
7	Point of contact for community	Not applicable	USACE Seattle and Portland Districts	USACE	Before start of field work
8	Access agreements	Letters, call, or visit stakeholders	Letters/conversations with stakeholders	USACE	Before start of field work
9	Conceptual site model	Report review	Report prepared for target areas near Alkali Lake	ODEQ	For inclusion in TPP Memo
10	Threatened or endangered species within AOC	Phone	OR Fish and Wildlife, U.S. Fish and Wildlife	Shaw	For inclusion in TPP Memo
11	Areas of cultural significance within AOC	SHPO	Phone SHPO	Shaw	For inclusion in TPP Memo

<sup>a</sup> Refer to EM 200-1-2, Paragraphs 1.1.3 and 2.2.



**Munitions Response Site Prioritization Protocol (MRSP) Data Gaps**  
**32 CFR Part 179**

Installation: Central Oregon Gunnery Range  
AOC: Air-to-Air Gunnery Range  
RMIS Range ID: F10OR0170

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type			x	Small and medium caliber arms
	2	Source of Hazard			x	Air-to-air, air-to-ground, and ground-to-air gunnery ranges
	3	Location of Munitions			x	Confirmed surface
	4	Ease of Access			x	No barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	< 100 persons per square mile
	7	Population Near Hazard			x	0 inhabited structures w/in 2 miles
	8	Activities/Structures			x	Agricultural - livestock grazing
	9	Ecological and/or Cultural Resources	x	U.S. Fish and Wildlife, SHPO		
	10	<b>EHE Module Score</b>				<b>60 to 70 EHE Rating D (Preliminary)</b>
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	< 100 persons per square mile
	17	Population Near Hazard			x	0 inhabited structures w/in 2 miles
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources			x	Ecological resources present
	20	<b>CHE Module Score</b>				<b>&lt; 38 CHE Rating G (Preliminary)</b>
Health Hazard Evaluation (HHE)	21	Groundwater Data Element	x	Evaluation Pending		
	22	Surface Water (Human Endpoint) Data Element	x	Evaluation Pending		
	23	Sediment (Human Endpoint) Data Element Table	x	Evaluation Pending		
	24	Surface Water (Ecological Endpoint) Data Element	x	Evaluation Pending		
	25	Sediment (Ecological Endpoint) Data Element	x	Evaluation Pending		
	26	Surface Soil Data Element	x	Evaluation Pending		
	27	Supplemental Contaminant Hazard Factor	x	Evaluation Pending		
	28	<b>HHE Module Score</b>	x	<b>Module Score Pending</b>		
MRS Priority	29	<b>MRS Priority (Based on Highest Hazard Evaluation Module Rating)</b>	x	<b>Final Score Pending</b>		
	A	<b>MRS Background Information</b>	x	<b>Pending</b>		

## Central Oregon Gunnery Range HRS Data Gaps

Information required to complete the MEC-HRS data collection form:

Item	Number	Comment – Missing Data Element
1	1.8	Confirm the latitude / longitude of potential source(s) and the accuracy of the information (in meters)
2		Source scale (i.e., 1:24,000, etc.)
3	1.12	Site Permits
4	6	Water use (GW within 4 miles, SW within 15 miles)
5	6.1	Total drinking water population served
6	6.2	Type of drinking water supply system (GW or SW?)
7	6.3	Other water uses of GW within 4 miles
8	6.4	Depth to Aquifer
9	6.5	Other surface water uses
10	7.1	Existence of sensitive or potentially vulnerable environment